

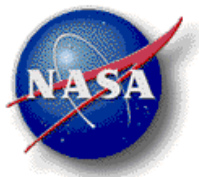
Modular Integrated Stackable Layers (MISL) MI_Battery Board Design Document (BDD)

Engineering Directorate
Avionic Systems Division

Verify this is the correct version before use

For correct version go to: \\JS-EA-FS-01\pd01\EV\EV2\MISL\MISL1.0\BDD
(This statement and pathname is mandatory on ASD Work Instructions)

Baseline
October 2013



National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058-3696

This document is under the Document Configuration Control of the *(identify controlling authority e.g., Configuration Control Panel, EV12 Office, OIU Project)*.
Printed hardcopy is for uncontrolled reference only. *(This statement is mandatory for ASD work inst.)*

Modular Integrated Stackable Layers (MISL) MI_Battery Board Design Document (BDD)

October 2013

Prepared by

Hester Yim

Hester Yim
EV2, MISL Project Manager

Approved by:

Paul Delaune

Paul Delaune
EV2, C&DH Deputy Branch Chief, MISL Manger

Susan Morgan

Susan Morgan
EV2, C&DH Branch Chief

Change Record

Rev.	Date	Originator	Approvals	Description

Table of Contents

1. Introduction.....	1
2. Description.....	1
3. Electrical Bus Connectors.....	3
• Power Bus Connector	3
4. Bill of Materials.....	4
5. Schematics	6
6. Top and Bottom Silkscreen.....	8

List of Tables

Table 1 Power Bus Connector Pin Assignment.....	3
Table 2 Bill of Materials.....	4

List of Figures

Figure 1.1 Top Side of MI_Battery board	1
Figure 1.2 Bottom Side of MI_Battery board.....	2
Figure 1.3 MI_Battery Board Schematic.....	6
Figure 1.4 Power Bus Schematic.....	7
Figure 1.5 Top Silkscreen.....	8
Figure 1.6 Bottom Silkscreen	9

1. Introduction

This is a board-level design document for Modular Integrated Stackable Layers (MISL) MI_Battery board. The BDD contains the description, electrical and mechanical design, and drawings.

2. Description

MI_Battery board is designed to use two-AA batteries and outputs both 3.3V and 3.0V. Each 3.3V or 3.0V output can be disabled by a jumper setting (J2). It also takes 5V input to use non-battery operation is possible. 5V output can supply up to 1.5A of current only if an external 5V input power regulator is connected via J1. When both batteries and 5V wall adapter are used, 5V wall input becomes the primary power source for the board. When 5V wall power is removed, the batteries are used as a default power source. Battery power can be turned off with S1. Each of 3.3V and 3V output can supply up to 400mA max with battery input or with external 5V input. There are several connectors added to provide alternate means of connections for other type of batteries and input power connectors. P2 is for an alternate battery input. P4 is for an alternate 5V power connector from external cable. P5 is for an alternate battery power switch connection. P6 and P7 are provided for alternate LED connections (i.e. on enclosure). P6 is for 3.3V LED. P7 is for 3.0V LED.

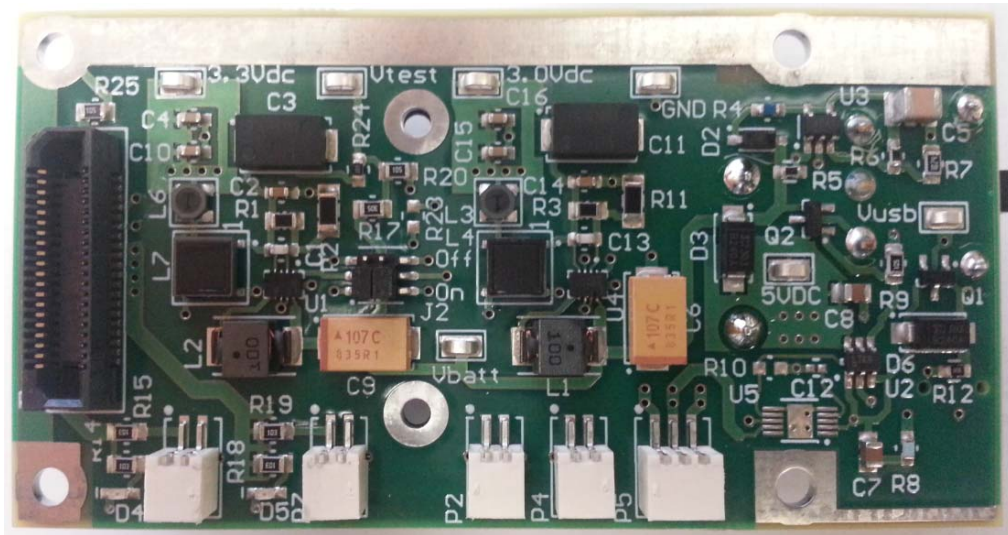


Figure 1.1 Top Side of MI_Battery board



Figure 1.2 Bottom Side of MI_Battery board

3. Electrical Bus Connectors

- Power Bus Connector**

Power bus connector is used to supply voltages that are commonly used in low power systems. Power bus connector, P1 female, mates to any top stacking board to pass power lines.

Table 1 Power Bus Connector Pin Assignment

Pin Number	Pin Name	MI_Battery Board, P1
1,3,5,8	5Vdc	5Vdc (Available only connected to 5V wall adapter)
2, 4,6,7	5VGND	5VGND* (Available only connected to 5V wall adapter)
9	1.8Vdc	Pass-Through
10	1V8GND	Pass-Through
11	2V5GND	Pass-Through
12	VTEST	VTEST
13	2.5Vdc	Pass-Through
14	3V3GND	3V3GND*
15,17,19,21	3VGND	3VGND*
16,18,20,22	3.0Vdc	3.0Vdc
23,25,27,29	3.3Vdc	3.3Vdc
24,26,28	3V3GND	3V3GND*
30,32	24VGND	Pass-Through
31,34	24Vdca	Pass-Through
33	Vusb	Pass-Through
35,37,39	9-36Vrtn	Pass-Through
36,38,40	9-36Vin	Pass-Through

R25, a 1MOhm resistor, is there to give an option to tie the internal ground to the chassis. *All signal grounds are tied at a single point on the board.

4. Bill of Materials

Table 2 Bill of Materials

	Designator	ManufacturerPartNumber	Alternate Part Number	Manufacturer	Description	Do Not Install
1	C4, C10, C15, C16	GRM188R71E104KA01D		Murata Electronics North America	CAP CER .1UF 25V 10% X7R 0603	
2	R14, R15, R18, R19	ERJ-6GEYJ103V		Panasonic - ECG	RES 10K OHM 1/8W 5% 0805 SMD	
3	C12	C0402C104K8RACTU		Kemet	CAP CERAMIC .10UF 10V X7R 0402	DNI
4	C2, C14	GRM188R61E105KA12D		Murata Electronics North America	CAP CER 1UF 25V X5R 0603	
5	R9, R20, R25	ERJ-6GEYJ105V		Panasonic - ECG	RES 1.0M OHM 1/8W 5% 0805 SMD	
6	R23, R24	CRCW06030000Z0EA		Vishay/Dale	RES 0.0 OHM 1/10W 0603 SMD	DNI - R23
7	C5	1210ZC106KAT2A		AVX Corporation	CAP CERM 10UF 10% 10V X7R 1210	
8	D2	B0520LW-7-F		Diodes Inc	DIODE SCHOTTKY 20V 500MA SOD123	
9	D3, D6	B240A-13-F		Diodes Inc	DIODE SCHOTTKY 40V 2A SMA	
10	R6	ERJ-3EKF1873V		Panasonic - ECG	RES 187K OHM 1/10W 1% 0603 SMD	
11	D4, D5	LTST-C191KRKT		Lite-On Inc	LED SUPER RED CLR THIN 0603 SMD	
12	R7	RC0805FR-071M02L		Yageo	RES 1.02M OHM 1/8W 1% 0805 SMD	
13	C1, C13	06031A330JAT2A		AVX	AVX - 06031A330JAT2A - CAPACITOR CERAMIC 33PF 100V, C0G, 0603	
14	L4, L7	DLW5BTN142SQ2L		Murata Electronics North America	CHOKE COMMON MODE 1400 OHM 2020	
15	R17	ERJ-6GEYJ305V		Panasonic - ECG	RESISTOR 3.0M OHM 1/8W 5% 0805	
16	R5	RNCP0603FTD27K4	ERJ-3EKF2742V	Stackpole Electronics Inc	RES 27.4K OHM 1/8W 1% 0603 SMD	
17	Q1, Q2	IRLML6401GTRPBF		International Rectifier	MOSFET P-CH 12V 4.3A SOT-23-3	
18	R10	CRCW06033K40FKEA		Vishay/Dale	RES 3.40K OHM 1/10W 1% 0603 SMD	DNI
19	P5	87438-0343		Molex Inc	CONN HEADER 3POS 1.5MM R/A SMD	
20	R8	MCT06030C1008FP500		Vishay/Beyschlag	RES 1.00 OHM 1/10W 1% SMD 0603	
21	C7, C8	C2012X7R1C475K	C2012X7R1C475K125AE	TDK Corporation	CAP CER 4.7UF 16V X7R 10% 0805	
22	R12	RNCP0603FTD2K00		Stackpole Electronics Inc	RES 2K OHM 1/8W 1% 0603 SMD	
23	P2, P4, P6, P7	87438-0243		Molex Connector Corporation	CONN HEADER 2POS 1.5MM R/A SMD	
24	R1, R3	ERA-6AEB4993V		Panasonic Electronic Components	Thin Film Resistors - SMD 0805 499Kohm 0.1% 25ppm	
25	P3	BH2AA-PC		MPD (Memory Protection Devices)	HOLDER BATT 2-AA CELLS PC MOUNT	
26	L1, L2	SDR0703-100KL		Bourns Inc.	INDUCTOR POWER 10UH SMD	

27	U5	LTC4053EMSE-4.2#PBF		Linear Technology	USB Li-Ion Battery Charger	DNI
28	J1	PJ-018H-SMT		CUI Inc	CONN PWR JACK 1.65X4.4MM SMT	
29	L3, L6	74402800011		Würth Electronics Inc	INDUCTOR POWER .11UH 4.6A SMD	
30	P1	ERF8-020-05.0-S-DV-K-TR		Samtec Inc	CONN RCPT 40POS 0.8MM GOLD SMD	
31	S1	MS13ASW30		NKK Switches	SW SLIDE SPDT SILV W/BRKT RA PC	
32	R2	ERA-8AEB2873V	ERA-8AEB2873V	Vishay	1206, "Thin Film Resistors - SMD 287Kohms .1% 25ppm	
33	R11	TNPW1206324KBEEA	<u>ERA-8AEB3243V</u>	Vishay	1206, "Thin Film Resistors - SMD 324Kohms .1% 25ppm	
34	J2	GRP032VWQS-RC		Sullins Connector Solutions	CONN HEADER .050" 6POS DL SMD AU	
35	U1, U4	LTC3528EDDB-2#TRMPBF	LTC3528BEDDB-2#TRMPBFCT-ND	Linear Technology	IC BOOST SYNC ADJ 1A 8DFN	
36	U2	LTC4410ES6#TRMPBF		LINEAR TECHNOLOGY	LINEAR TECHNOLOGY - DP-Power Controller, USB Power Manager	
37	U3	MAX6845UKD0(+T)		Maxim Integrated Products	Supervisory Circuits Single uPower Reset Circuit	
38	R4	MCT0603MD1000DP500		Vishay/Beyschlag	RES 100 OHM 0.15W 0.5% 0603	
39	C3, C11	EEF-UD0K101ER,		AVX,	Aluminum Organic Polymer Capacitors 100UF 8V SPEC POLYMER SMD,	
39a	C6,C9	TPSD107K016R0060		Panasonic Electronic Components	Tantalum Capacitors - Solid SMD 100UF 16V 10% D	
40	W1				NetTie	DNI
41	M1, M2, M3, M4			TBD	Standoff	DNI
42	T1, T2, T3, T4, T5, T6, T7		5015KCT-ND		TEST POINT	

5. Schematics

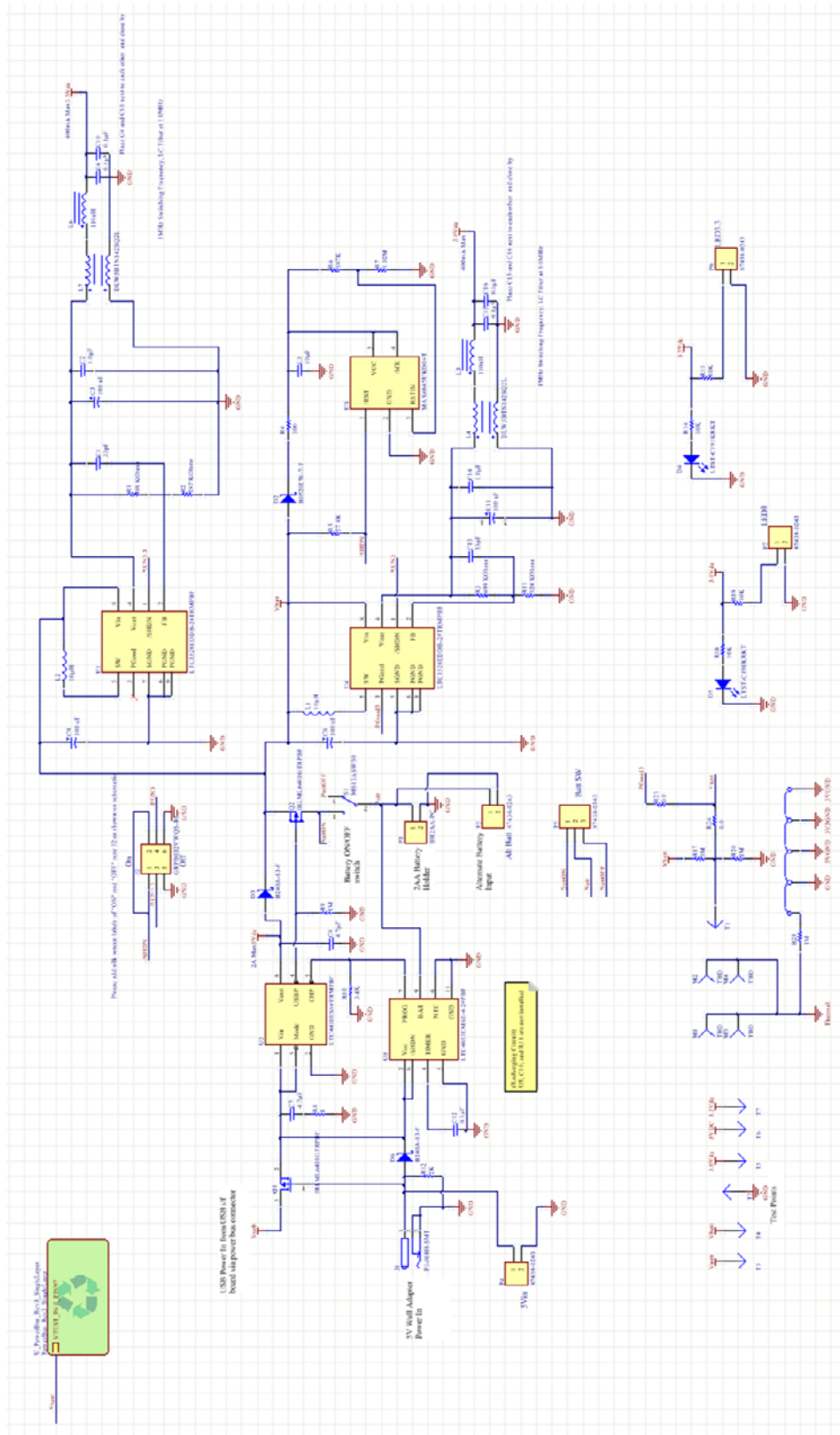


Figure 1.3 MI_Battery Board Schematic

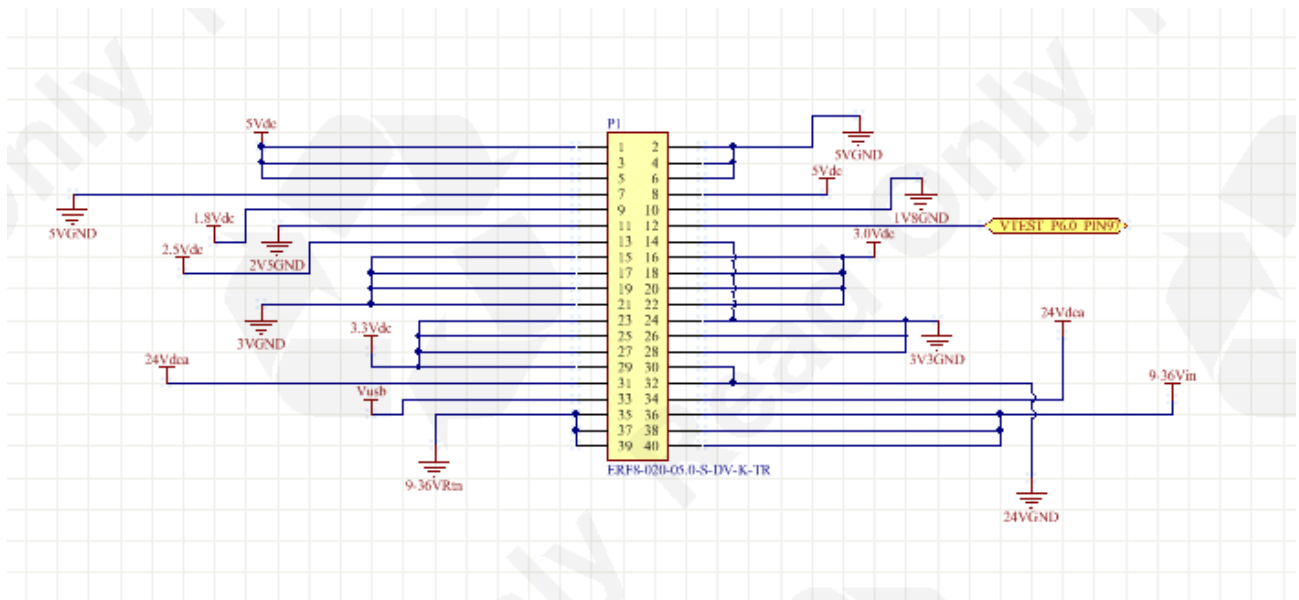


Figure 1.4 Power Bus Schematic

6. Top and Bottom Silkscreen

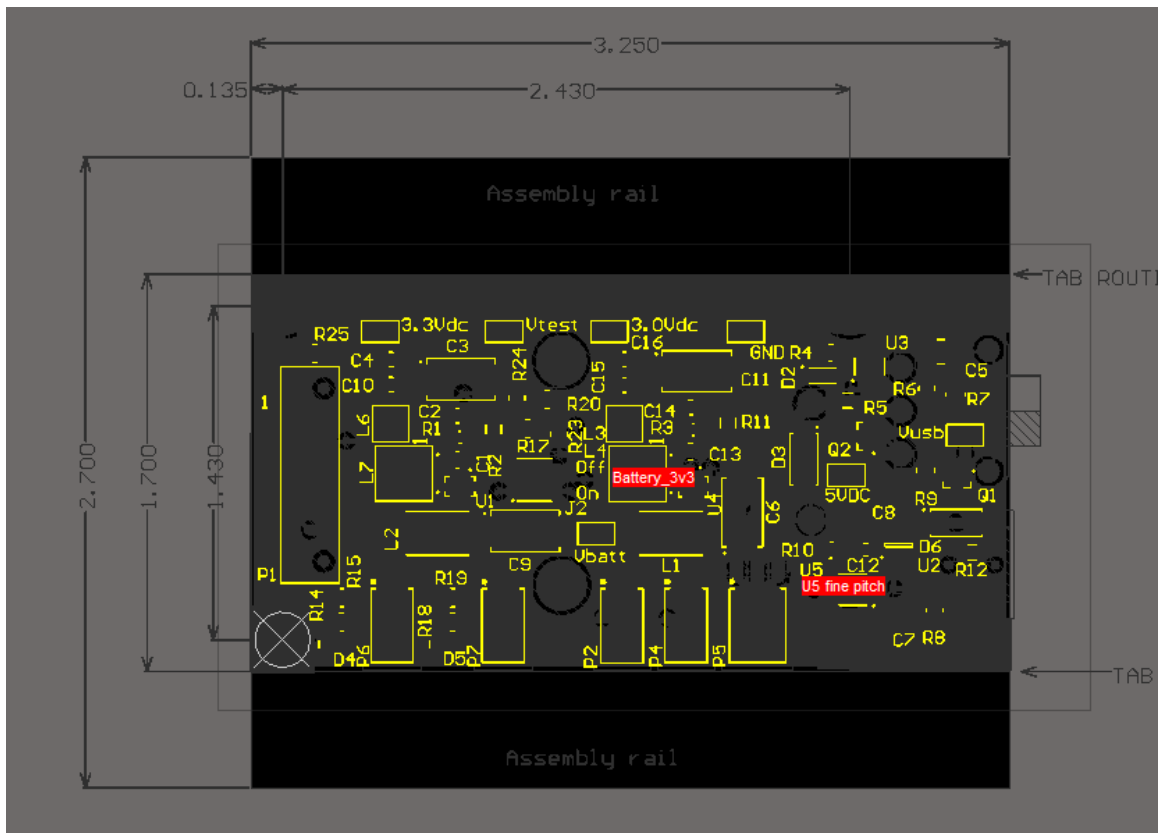


Figure 1.5 Top Silkscreen

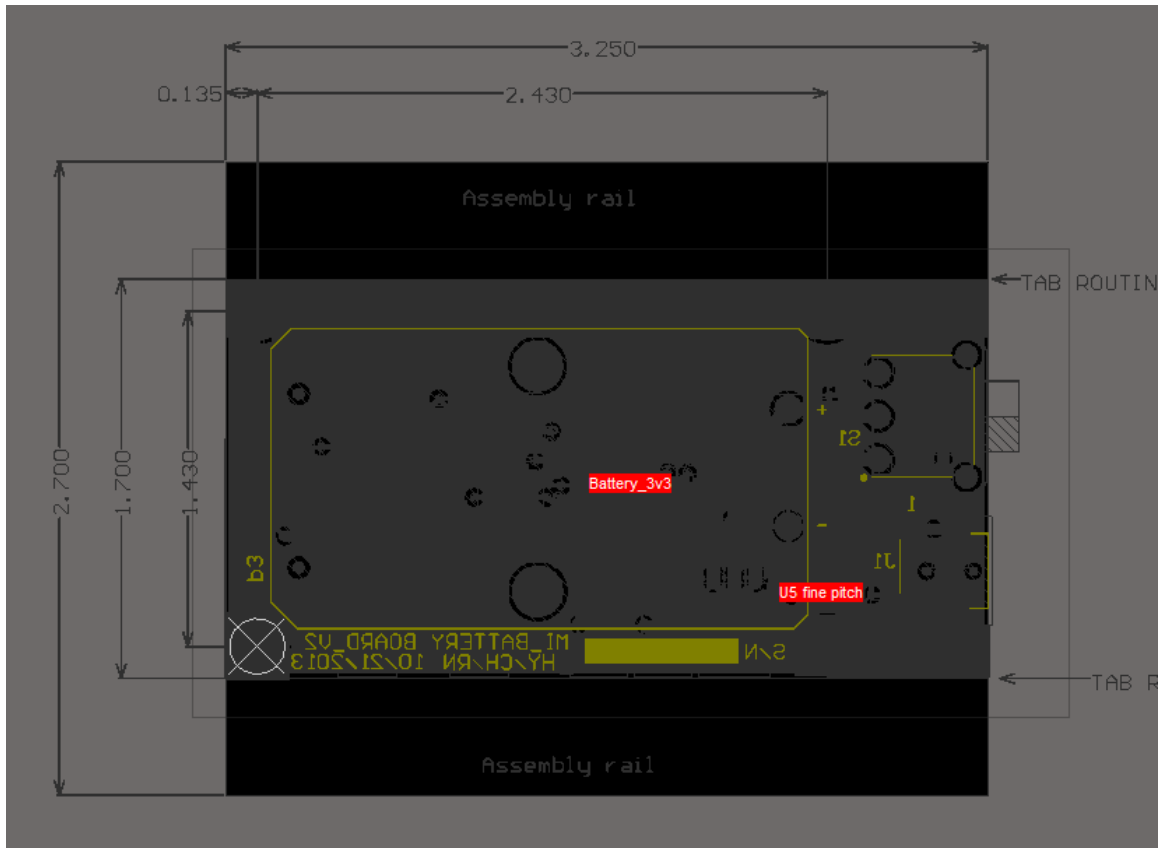


Figure 1.6 Bottom Silkscreen

Appendix A - Acronym List

The Appendix heading is obtained by choosing the Heading 9 from the Style drop down menu.

ASD	Avionic Systems Division
EA4	Systems Engineering Office
EV12	GFE Projects Office
GFE	Government Furnished Equipment

Appendix B - Supporting Data